EPA has reviewed the Draft *Treasure Island Radiological Scoping Surveys Sampling and Analysis Plan"* and provides the following comments:

General Comments

The document contains 37 worksheets that summarize and tabulate various site-specific facts and organization-related requirements for the planned scoping surveys at Treasure Island. Still missing are essential items that I identified in EPA's May 16th review of the *Basewide Radiological Management Work Plan*:

- Data Quality Objectives (DQOs)
- MARSSIM-based survey designs, including
  - Designation of Class 1, Class 2 and Class 3 survey areas
  - Calculated sample spacings
  - Sample collection location diagrams
- Laboratory procedures, and an evaluation of the various laboratories' measurement sensitivity, precision and specificity
- Laboratory sample collection, packaging and shipment requirements

The SAP restates information that was included in the previous report, listing 13 potentially radiologically impacted locations in eight Areas of Interest (AOIs) that the Navy identified in a Historical Radiological Assessment (HRA) that was prepared by Weston Solutions and submitted in February 2006, and in a Supplemental Technical Memorandum that was prepared by Tri-Eco and Tetra Tech EMI, and submitted in August 2012. The SAP also lists the potential radionuclides of concern (ROCs), Cs-137, Ra-226 and Th-232, that were previously listed in the Work Plan. The 13 potentially impacted locations are enumerated with their associated ROCs in Worksheet #10, Tables 10.1, 10.2 and 10.3. Those 13 locations were, or might have been, affected by (1) ship repair or solid waste disposal operations; by (2) releases that were incidental to training; or by (3) spills or other contamination that resulted from handling contaminated soils associated with Installation Restoration (IR) Site 12. Releases that might have been incidental to training include those from the mockup USS Pandemonium that has been described several times over the past few months in the local news. Those 3 contamination scenarios constitute the conceptual site models (CSMs) that will serve as the basis for the survey criteria that the contractor should have provided in the SAP, but did not.

The SAP also restates the radiological screening criteria in Worksheet #11, Table 11.1, which are based on the U.S. Nuclear Regulatory Commission's Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, dated June 1974 and reviewed December 2011. Worksheet #11 also provides a procedure for establishing DQOs, but it does not provide any linkage between the DQOs and the radiological screening criteria. Although the previous document (the Work Plan) supplemented the rationale for use of the contamination limits in Reg Guide 1.86 by equating a 10^{-4} risk level to an annual radiation dose rate of 5 mrem/year (residential scenario), Worksheet #11 makes no mention of either a risk or dose rate target. EPA's May 16th review addressed the relationship between risk and dose rate that EPA believes the Navy's contractor should use.

Specific Comments

Worksheet #12 states that there is no need for field blanks because only disposable sample collection supplies will be used. However, that rationale does not address the effects that sample collection supplies, sample packaging, or the introduction of field contamination could have on samples.

Worksheet #15 lists laboratory measurement detection limits. However, the SAP (1) does not compare the measurement detection limits to the radiological screening criteria that are listed in Worksheet #11; (2) nor does it bear any relationship to any DQOs; and (3) there is no evaluation of the concentrations

(e.g., pCi/gm) listed for the measurement detection limits in Worksheet #15 with respect to surface area contamination limits (e.g., dpm/100 cm^2) that are listed in Table 11.1.

Although Worksheet #17 provides a table that lists key survey design elements for Class 1, Class 2 and Class 3 areas, no part of the SAP specifically identifies those areas, or provides a calculation of the sample spacings, or provides sample collection location diagrams.

Worksheet #18 is a table of sample and analysis requirements for seven groups of areas, and it lists the estimated number of samples that will be required for each group. However, the SAP does not provide any rationale for the numbers of samples, and this table does not seem to have any bearing on the designation of Class 1, Class 2 and Class 3 areas, or on calculated sample spacings. The sample collection depth has no apparent connection to the three contamination scenarios that constitute the conceptual site models (CSMs), that presumably serve as the basis for survey criteria.

Worksheet #30 lists the laboratories that will perform the various sample analyses for the project. However, no part of the SAP provides any evidence that the laboratories will meet the measurement detection limit requirements that are listed in Worksheet #15.

Worksheet #36 lists criteria that will be used in EPA Level IV and Level III data validations. However, it does not state which data will be subject to any specific validation procedures.

Appendix A provides standard operating procedures and worksheets for field sampling. EPA did not review those procedures in detail.

Appendix B provides standard operating procedures for the laboratory, including measurements. SOP No. ST-RC-0041, Rev. 11 dated July 6, 2012, and titled *Radium 226 and Radium 228 by Chemical Separation Preparation*, only provides a procedure for measurement of Ra-228, and not for Ra-226. There are two serious deficiencies in that procedure:

- The procedure is for measurement of Ra-228 in drinking water, but not in complex water samples or soil. Soil samples, in particular, require additional sample preparation, typically either a fluoride/pyrosulfate fusion or a hydrofluoric acid leaching.
- The procedure does not address the complex calculations that are required for converting the raw measurement data to the quantity or concentration of Ra-228 in the sample. In my experience, the procedure that the SOP references, *Prescribed Procedures for Measurement of Radioactivity in Drinking Water, Section 8, Method 904.0, Radium 228 in Drinking Water*, which appears to have been taken from a USGS procedure without attribution, contains an error in the formula that is used for calculations, that was not present in the original USGS procedure. Therefore, it is exceptionally important that the Ra-228 procedure list the formulas that the laboratory will use for calculating the amount of Ra-228 that is measured.

Conclusion

Although the document provides considerably more operational detail than the Work Plan did, it is still only an outline for a survey work plan along with much of the boilerplate and supporting documents that typically are submitted with work plans or SAPs, and it still does not provide any of the necessary details about either the survey design and layout, or specific DQOs.

Lacking these elements, neither the Work Plan nor the present SAP provide much more than a task list for developing the essential elements of the planned survey.